

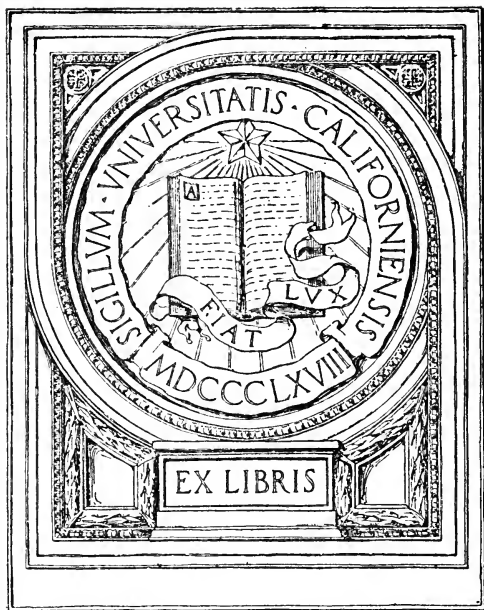
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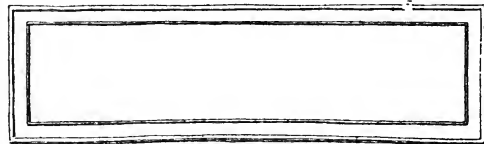


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WAR DEPARTMENT.

Document No. 729.

*Office of The Adjutant General.*

R. M. R. 1

WAR DEPARTMENT,

WASHINGTON, *January 14, 1918*

The following pamphlet, entitled "Instructions on Wiring (Wire Obstacles)," is published for the information of all concerned.

[A. G. O. No. 062.1.]

BY ORDER OF THE SECRETARY OF WAR:

TASKER H. BLISS,

*General, Chief of Staff.*

OFFICIAL

H. P. McCAIN,

*The Adjutant General.*

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# INSTRUCTIONS ON WIRING

## I.—INTRODUCTION.

1. The object of these notes is to standardize the construction of obstacles and to limit the patterns taught and used.

2. There are at present too many types of wire entanglements, and too many "drills" for erecting them in use. Recruits may learn three or four "drills" at home, and then others at the Base in France; yet on reaching his company or battalion the men may be told to forget all these and to adopt the divisional standard pattern. When only short training is possible, this can only lead to inefficiency.

3. To ensure that all training is directed to the same purpose, four patterns of entanglements have been selected, and these, and the drills for erecting them, will be the regulation ones. Units are forbidden to adopt any other without previous sanction. This does not mean that these four standards may not be modified if lack of men or materials demand it; *e. g.*, for very rapid work one of the aprons in the "apron fence" might be omitted; but such things as aprons with crossed diagonals and other fancy patterns of wire will not be used.

4. It is only by adopting this course that efficiency in this matter can be maintained. If in any unit a better type or drill is discovered, the fact should be reported. The new method will then be thoroughly tested under G. H. Q. arrangements, and if found more satisfactory will be adopted officially in place of the old one, and all units and training schools will be informed.

5. The following are the four standard patterns which have been selected:

- (1) Emergency obstacle (French wire).
- (2) Belts of concertinas.
- (3) Low (or knee-high) wire entanglement.
- (4) Double apron fence.

6. These four patterns cover every type of material for entanglements in existence at present, or likely to be found in the field.

## II.—GENERAL PRINCIPLES.

7. Rapidity in wiring depends on:

(a) The confidence with which the men handle the wire (*see* 40).

(b) The simplicity of the pattern of wire entanglement employed.

(c) Careful organization of parties and material.

8. In working out a drill the following points should be borne in mind:

(a) No one group of men should ever cross another in the course of its work; the groups should work in echelon and in the same direction.

(b) As few men as possible should be employed.

(c) Work must be arranged so that the men are not bunched.

(d) The pattern and method of erecting should be such that no group has to step over wire previously laid by another group.

(e) As far as possible, men should not have to work on the enemy side of the wire. As a matter of fact, except in difficult situations, this is not a very important consideration. There should always be a covering party in front.

(f) The pattern of wire and method of erecting must be simple. It is an established fact that a broad "light"\* wire obstacle is less easy to cross, less easily destroyed, and less visible in aeroplane photographs, than a narrow "heavy" one. If considered necessary, a light simple framework can always be thickened with loose wire, concertinas, gooseberries, etc. The tendency to overdo this is very noticeable, and should be discouraged. Some entanglements have been made so thick that the wire forms a carpet, and can be walked over with ease.

## III.—NOTES ON MATERIALS.

### Barbed Wire.

9. The length of *barbed wire* on a coil differs considerably. Some coils may be 50 yards long, others as much as 120 yards. It is hoped that supply will shortly be made in 50-yard or 100-yard lengths. The weight, including the drum, of 100 yards of wire is about 28 pounds; of 50 yards, about 15 pounds.

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\*"Light" being used in the sense that the number of strands of wire in the entanglement is not very large.



## Pickets.

10. The lengths of the screw pickets are:

Long pickets, 5 feet, with four eyes.

Medium pickets, 3 feet 6 inches, with two eyes.

Anchorage pickets, 1 foot 6 inches, with one loop.

11. The pickets are supplied in two weights:

	Heavy weight, about	Light weight, about
Long .....	9 lbs.	6 lbs.
Medium .....	6½ "	4½ "
Anchorage .....	3¼ "	2½ "

12. The light weight pattern, which has been recently introduced, is said to be apt to get bent out of shape.

13. In the original pattern of the long heavy screw picket, the eyes were two on one side of the post and two on the other; in all pickets now manufactured, the eyes are all on the same side.

14. Angle iron pickets are supplied in two lengths:

5 foot 10½ inches and 3 foot 6 inches.

## French Wire.

15. "French wire" is 3 feet 6 inches in diameter when closed and can be pulled out to form a cylinder of wire 60 feet long. It is made of plain wire.

16. There are two types: French manufacture and English manufacture. The former can be distinguished from the latter by the wire, which is of a smaller gauge and more pliable. Some of the French manufacture has a few small flat barbs.

17. German manufactured "French wire," which is often available on the spot where it is required, is made of stouter wire and is about double the weight of the French and English article. It is very resilient and is a fair obstacle even without any support from pickets.

18. If the French wire coils are of French manufacture, one coil is a man-load. This is not due to its weight (14 lbs.) but to its clumsiness. The easiest method of carrying it is to bend it into a figure of eight. If the French wire coil is of English manufacture, the figure of eight can be further doubled on itself

to form a circle of about two feet diameter, and then two coils, 28 pounds (*see* Plate 1, Fig. 1), can be carried by one man. This cannot be done with a French manufactured coil as the wire has not the same spring as the English one; it consequently gets bent out of shape and will not pull out easily.

### **Barbed Wire Concertinas.**

19. The chief objection to barbed wire concertinas is that they are clumsy to carry. The most satisfactory arrangement is to make them 4 feet in diameter and to have nine pickets in the circle. Then 24 complete turns taken on the circle of the pickets will use up 100 yards of light barbed wire, and the concertina will pull out to 18 feet. For method of construction see below.

20. No satisfactory barbed wire concertina has yet been made for use with medium pickets.

21. No advantage is gained by using iron hoops at the end of the concertina; the concertina does not stand up any better; it is much heavier and requires more men to erect it. The best method of keeping the concertinas from sagging when erected is to run a taut wire along the top of the posts and windlass the concertina up to it. (*See* Drill II. for Concertina Wire.)

22. A man must use both hands to pull a concertina out. Handles wired on at the ends of the coil are not generally suitable, and the men do not use them. The best method is to form a good plain wire end with four turns of No. 14 wire or two turns of No. 12 wire. (*See* 28.)

23. The best method of preparing concertinas for carrying is found to be as shown in Plate 1, Fig. 2. The 6-foot laths must be tightly wired together. These laths are taken off by the numbers who carry when the concertinas have been taken out to the task. If they are left on, the concertinas are more difficult to erect, and the laths creak and make a noise against the posts.

24. A concertina thus prepared is a one-man load across country or in wide trenches with easy corners. In narrow trenches it is a two-man load. (*See* Plate 1, Figs 3*a* and 3*b*.)

### **Method of Making Barbed Wire Concertinas.**

25. Draw a circle 4 feet in diameter. Place nine posts equally distant, approximately 17 inches centers) round this circle and

drive them in, leaving a height of 5 feet above ground. Angle iron pickets are much easier to work with than wooden ones.

26. One 100-yard coil is required per concertina, with short lengths plain wire for fastening.

27. The unit party is three men. No. 1 works inside the framework; Nos. 2 and 3 run out the coil, No. 2 helping No. 1 if necessary.

Average time per concertina is 20 minutes.

28. (i) Take two complete turns round the nine posts with No. 12 plain wire, or four turns with No. 14 wire, and bind these turns together, at each interval between posts so as to form a secure end for pulling the concertina out.

(ii) Fasten the end of the barbed wire on to the plain wire and take twenty-four turns with it round the posts in a spiral form binding two consecutive turns together at *every other* interval. (Hence the necessity for an odd number of posts—9.)

(iii) Make two turns with plain wire and make fast as in (i).

29. It is a great advantage to have a nonagonal shaped framework, made of three angle iron pickets (5 feet 10½ inches) or of wood, to fit over the top of the nine pickets, so as to keep them properly splayed out. It is easily removed when the concertina is finished (Plate 1, Fig. 4).

30. The easiest method of carriage is to wire on two 6-foot laths and tie two points at right angles to the laths with plain wire. The laths must be tightly fixed and plenty of end left to the plain wire so that it can be easily undone. (See Plate 1, Fig. 3.)

### **Method of Preparing Loose Wire.**

31. The task of throwing loose wire into an entanglement from a coil is a long and tedious one. It is made very much easier and quicker if the wire is coiled in a spiral form beforehand.

32. To do this, drive in two 3-foot stakes, 3 feet apart, and two more at right angles to them 1 foot 6 inches apart, as shown in Plate 2, Fig. 5. Then wind 100 yards of barbed wire round this diamond shaped framework gradually working it up the stakes in a spiral. Finally take the spiral off the stakes and tie it together in four places with plain wire.

33. A spiral thus made can be easily carried, by a man on his shoulder, in a trench.

34. To use it as loose wire, undo the plain wire bindings, carry the spiral on the left arm and walk along throwing two or three coils at a time into the entanglement.

35. One spiral supplies enough loose wire for a bay 2 yards wide and 25 yards long. It takes two men 5 minutes to make one of these spirals, and a man can throw it in as loose wire almost as fast as he can walk. If spirals are needed in large quantities, a winch, as shown in Plate 2, Fig. 6, is useful and saves time and labor.

36. If time and opportunity to make spirals are lacking, loose wire can be placed as follows: Uncoil a 50-yard length on the ground, cut it, pick it up with a long forked stick, twisting it to and fro, and throw it on the entanglement. Press it well down and secure it to the wires already in position by 10-inch lengths of binding wire.

#### Portable Knife Rests.

37. A portable form of knife rest copied from the French and known as *Réseau Pliant* is available. The distance piece is collapsible, and when it has been removed the two ends can be closed together by rotating one towards the other. Its length is 6 feet 6 inches, and in height about 2 feet 6 inches. It forms a load for one man.

#### Man-Loads.

38. The following are found to be convenient man-loads of various materials used in wire entanglements. The numbers have been worked out not only as fair loads for the average infantryman, but also to facilitate wiring parties.

Material	No.	Average Total Weight.
Heavy screw (long) pickets 5' long with four eyes.....	4	36 lbs.
Light	6	36 "
Heavy screw (medium) pickets 3' 6" long with two eyes.....	6	39 "
Light	8	36 "
Heavy screw (anchorage) pickets 18" long, with loop.....	8	26 "
Light	16	40 "
Angle iron pickets 5' 10½" long.....	4	43 "
3' 6"	6	37 "
Wooden posts 5' long, 3"—3½" diameter.....	4	—
Wooden pickets 2' 6" long, 2½" diameter.....	16	—
Coil barbed wire 100 yards length.....	1	28 "
50	2	30 "
French wire coils.....	See French wire (para. 15)	
Concertinas.....	See Concertinas (para. 19)	

39. With Yukon packs heavy loads (including pack which weighs 8 pounds) from 48 to 64 pounds, and average loads of 40 to 44 pounds can be carried.

Load	Barbed Wire Coils	Long Screw Pickets (heavy) No.	Anchorage Pickets (heavy) No.	Total Weight with pack (lbs. average)	Remarks
A	2	—	—	64	Heavy loads only possible for short distances.
B	1	2	2	60	
C	1	2	—	52	
D	1	1	1	48	
E	1	—	2	44	Average loads.
F	1	1	—	44	
G	1	—	1	40	
H	—	4	—	40	
I	—	—	8	40	

### HANDLING OF MATERIAL.

40. Rapidity in wiring depends very largely on the ability of the men to handle wire. Men must be trained to use it with confidence and not to be afraid of it. It is like a stinging nettle; if a man is not frightened of it and treats it as if it were a rope, it will not hurt him.

#### Gloves.

41. If gloves are used they should be fingerless, as the fingers, especially the little one, are apt to catch in the wire. The best sappers and men who have had long experience in wiring never use gloves.

#### Running Out Coils.

42. A great many drills have detailed two men to run out a coil. This is absolutely unnecessary, as one man can do it with ease. The stake must be so made that the coil revolves easily on it, and be so held that the wire runs out from underneath the coil and not from the top (Plate 2, Fig. 7). If the coil is held the other way and the wire gets caught up at all, the sudden strain tends to throw it up in the man's face.

## RULES.

### Screw Pickets.

43. The following rules should be adopted for all work with screw pickets:

(i) *Laying out pickets.* Pickets must always be carried under the left arm and placed on the ground with the right hand, and in such a way that the end of the screw faces the enemy, and indicates the spot at which the picket is to be screwed in.

(ii) *Long pickets* must be screwed in so that the eyes are parallel to the length of the entanglement, and the end of the top eye points to the direction from which the men are working, *i. e.*, to the head of the task.

(iii) *Medium pickets* must be screwed in so that the eyes are parallel to the length of the entanglement, and in the case of the heavy pattern the point on the top eye is on the enemy side; in the case of the light pattern, the point on the top eye is on the home side.

(iv) *Anchorage pickets.* Same rule as for "long pickets."

44. It must be impressed on all that if the above rules are observed:

(i) It is much easier to fix the wire in the eyes.

(ii) Loss of direction is impossible.

### Fixing Wire.

45. For fixing wire on to screw pickets the following rules should be adopted (*see* Plate 2, Figs. 8 and 9):

(i) Men fixing the wire must always work facing the enemy.

(ii) *To fix wire in top eye of long pickets, and loop of anchorage pickets:*

Pull the standing end taut and slip the wire up into the eye; turn the running end up over the eye towards the end of the eye thus threading the wire in the eye. Then take a turn with the running end round the picket below the eye.

(iii) *To fix wire in lower eyes of long or medium pickets when there is already a wire in the top eye:*

(a) Pull the standing end taut and slip the wire up into the eye. Then take the bight on the running end, pass it

round the picket *above* the eye, then finish off by taking a turn with the bight on the running end.

(b) In the long picket, one eye is on the opposite side of the picket to the other three. In this case the wire must be forced down into the eye and the bight on the running end passed round the post under the eye.

(iv) All horizontal wires of an apron must be fixed to the diagonal stays by windlassing (Plate 3, Fig. 10).

46. If these rules are carried out, the wire will be firmly fixed in the eye and cannot slip up or down the post; also, if one bay is cut, the wire in the bays on either side remains taut and does not slip through the eyes.

47. The above methods of fixing wire are found to be far more satisfactory and rapid than employing short lengths of plain wire. The latter method is slow, and the plain wire almost invariably runs short, or is forgotten or lost at night.

48. The above rules apply whichever way the wirers are working—from right to left or left to right.

### **Holdfasts.**

49. Wooden pickets used as holdfasts should be driven in roughly at right angles to the stay wire that is attached to them, but screw anchorage pickets must be put in in the direction of this stay wire or they will be drawn in the direction of the strain.

50. *All bundles of screw and angle iron pickets* should be *wrapped round* with a sandbag and secured in at least two places by a turn of plain wire, with the ends twisted together. Enough end to this wire must always be left so that it can be untwisted by hand without pliers.

51. *Long wooden pickets* should be *tied* together in at least two places with plain wire. Short wooden pickets are best carried in sandbags eight in each bag; the two bags are tied together and slung over the shoulder.

52. *Windlassing sticks*.—Every man of a wiring party should carry the helve of the entrenching implement, or a short 2-foot stake or iron bar ( $\frac{1}{2}$ -inch diameter). These are necessary for:

- (i) Screwing in pickets.
- (ii) Screwing out coils of barbed wire.
- (iii) Windlassing wire.

53. Iron bars are only necessary when working in hard

ground. They should be bound with whipcord, or a double thickness of canvas, to avoid noise. If they are used, a short stick about 9 inches long should be carried for windlassing.

54. *Marking end of coil.*—The plain wires securing a coil of barbed wire must be cut, and a piece of sandbag or white cloth tied to the running end of the coil, in order that there shall be no difficulty in finding it at night; the pieces of tin on the wooden drums must be broken off to prevent noise. All this should be done before material is taken forward for work.

55. *Wire cutters.*—It very seldom occurs that there are enough wire-cutters to give a pair to every man in a wiring party. If stores have been properly prepared beforehand, there is no necessity for anybody except the officers and noncommissioned officers to have a pair, and the issue of wire-cutters should be strictly limited to them.

## **DESCRIPTION OF THE STANDARD OBSTACLES.**

### **I.—Standard French Wire (Emergency) Obstacle. (See Plate 4.)**

56. This is the most rapid form of entanglement (*see* table below). It must not be regarded as a permanent obstacle but merely one that can be rapidly put up and is capable of being strengthened afterwards. It is a standard to be adopted on emergency and every man should be trained in its erection.

57. The pattern selected consists of two belts of French wire one yard apart with a horizontal barbed strand along the top of each belt; a trip wire windlassed on the front of the enemy belt; and loose wire thrown in between the belts. Many drills have included a diagonal wire connecting the two belts together, instead of loose wire. This diagonal wire is of very little value, and the erection of it is very slow, as the men have to be continually stooping under it. It must be remembered that the essence of a French wire entanglement is rapidity, and its chief use is in a situation when rapidity is essential. The addition of loose wire and a trip wire certainly make the entanglement more efficient, and it can be made as quickly as the French wire itself can be erected. The organization of the wiring party is so arranged that two spare men do this. If circumstances therefore demand that the trip wire and loose wire should be omitted, the organization of the rest of the party is not affected.



## **II.—Concertina Wire.** (*See Plate 5.*)

58. A very rapid entanglement consisting of concertinas, pickets, and one horizontal wire along the top of the pickets. It has two rather serious disadvantages, in that it requires a good deal of preparation beforehand, and entails large carrying parties.

59. At least two rows of concertinas should be erected (1 yard apart in the clear) to form an effective entanglement. One row is not sufficient.

## **III.—Low (or Knee-high) Wire Entanglement.** (*See Plate 6.*)

60. This entanglement consists of three rows of medium pickets, a horizontal wire along the top of each row, one diagonal wire in each of the two bays formed by the three rows, and finally loose wire thrown into the bays.

61. It is not a very effective entanglement, but its chief value lies in the fact that it is not conspicuous. It is the slowest entanglement to erect at night, if screw pickets are used, as the latter are very hard to find. This difficulty can be overcome by laying down a spun yarn line or tracing tape.

## **IV.—Double Apron Fence.** (*See Plate 7.*)

62. This entanglement consists of four horizontal strands on the fence, and three, including the trip wire, on each apron.

63. Taking into consideration the following points:

- (a) Effectiveness;
- (b) Amount of preparation required beforehand;
- (c) Size of carrying party;
- (d) Rapidity and simplicity of erection;

the double apron fence is undoubtedly the best pattern of entanglement yet evolved, and stands up against shell fire or Bangalore torpedoes as well as any other pattern. For very rapid work over long lengths, the back apron was often omitted at the beginning of the war, and the entanglement thus modified was found amply sufficient to hold up the most determined enemy attacks. The value of the entanglement lies chiefly in the front apron, which should never be omitted. The men work behind the wire the whole time, and there is no stepping over wires previously erected.

64. Belts of double apron fences form an excellent framework

for a wide obstacle. Concertinas, gooseberries, or loose wire can be thrown in between the bays for thickening purposes.

65. The "drills" given below are equally applicable, whether screw, wooden or angle iron pickets are used.

The spacing of the posts and pickets has been worked out with due consideration to efficiency and keeping the size of carrying parties down as small as possible. The spacing shown in the plates has been found to give the best mean between these two conflicting views.

#### Time.

66. On the assumption of work in the following conditions:

(1) Stores are taken up by a separate carrying party as far as the fire trench only.

(2) The entanglement is erected 35-50 yards from the fire trench. Stores have, therefore, to be carried out that distance by the wiring party.

(3) The men work in battle order.

The following data have been arrived at with good average parties (not picked men):

Pattern and Length	Wiring party		Carrying party		Average time by day-light	Average time by night
	N.C.O.	Men	N.C.O.	Men		
50 yds. French Wire (Emergency) Entanglement	1	9	1	18*	10 mins.	20-30 mins.
50 yds. double belt of concertinas	1	7	2	43†	20 mins.	½—¾ hour
50 yds. Low (or Knee-high) Wire	1	7	1	18	30 mins.	1—1¼ hours
50yds. DoubleApron Fence	1	9	1	15	30 mins.	¾—1 hour

\* 15 men if French wire coils are of English manufacture.

† 27 men if stores can be carried across country.

## DRILL I.

### DRILL FOR 50 YARDS' LENGTH STANDARD FRENCH WIRE (EMERGENCY) OBSTACLE.

#### Materials.

1. Six bundles of four posts each.
2. One (mixed) bundle, containing two long and four anchorage pickets. (Anchorage pickets to have a plain wire stay fixed on.)

3. Six coils French wire.
4. Twenty-four staples.
5. Three coils of barbed wire.
6. Two spirals barbed wire.

### Wiring Party.

One N.C.O. and 9 men. The N.C.O. carries cutting pliers, and each of the party a windlassing stick. Gloves as desired.

### Carrying Party.

One N.C.O. and 18 men, if French wire coils are of French manufacture.

One N.C.O. and 15 men, if French coils are of English manufacture.

### Tasks.

Group	Nos.	1st Task	2nd Task	3rd Task	4th Task	5th Task
A.	1	Carry out one mixed bundle.	Lay out and screw in outer line of pickets.	Erect F.W. coils on outer line pickets.	Lay out and screw in inner line pickets	Repeat 3rd task on inner line pickets.
	2					
	3	Carry out 3 bundles pickets and 24 staples.		Windlass coils together and staple down.		
	4					
B.	5	Carry out stores:—six coils French wire—three bundles pickets.		Put on top horizontal wire on outer line pickets.		Put on top horizontal wire on inner line pickets.
	6					
	7					
C.	8	Carry out all barbed wire stores, i. e., three coils barbed wire, two spirals.		Put trip wire on outer belt French wire and windlass on to coil.		Throw in loose wire between the 2 belts French wire.
	9					

### Detail.

1. The N.C.O. leads out the whole party to the head of the work. No. 1 carries the mixed bundle, and No. 4 the staples, in addition to his bundle of posts. *A Party* undoes its bundle of posts while the N.C.O. shows *B and C Parties* where to dump their stores.

2. When ready, the N.C.O. picks up one anchorage picket and

then indicates to No. 1 where to lay the head anchorage picket and first long picket. Having laid these out, No. 1 immediately starts screwing them in. The N.C.O. then indicates to Nos. 2, 3 and 4 in turn where to lay their respective pickets, and finally lays down the anchorage picket at the end of the task. When No. 1 has finished screwing in his anchorage picket and first post, he assists No. 2.

3. As soon as Nos. 1 and 2 have finished screwing in their pickets, they return to the head of the work and pick up a French wire coil. No. 1 slips his end over the first picket and then fixes the plain wire stay attached to the anchorage picket to the first long picket. No. 2 pulls the coil out to the fifth picket, *i. e.*, 16 yards, and slips the bottom of it only over the picket. No. 1 lifts and places the coil over the two pickets nearest him, *i. e.*, in this case the second and third pickets; while No. 2 lifts and places the coil over the picket nearest him, *i. e.*, in this case the third. No. 1 gets another coil, joins No. 2, and slips his end of the coil over the fifth picket, and then slips the top of the first coil over the picket. No. 2 meanwhile is pulling the coil out 16 yards, *i. e.*, to the ninth picket, and the same procedure is followed as in the case of the first coil.

In this task Nos. 1 and 2 must only slip the French wire coil over the picket and must not fasten it in the top eye. This is necessary, as it makes work much easier for B Party. In pulling out the coil No. 2 has to remember to miss three pickets and slip his end of the coil over the fourth from the one that he started from. The N.C.O. should supervise this.

4. As soon as No. 3 has finished screwing in his four pickets, he returns to the head of the task and staples down the French wire midway between each pair of pickets, *i. e.*, he has to put in 12 staples in the 50-yard belt.

As soon as No. 4 has finished screwing in his four pickets and the anchorage picket at the end of the task, he returns and windlasses the French wire coils together at their junctions and fixes the plain wire stay attached to the anchorage picket.

5. By the time *B Party* has finished carrying out its stores, one French wire coil is in position, and it can start putting the horizontal wire along the top of the pickets. No. 5 runs out the barbed wire coil. No. 6 fixes the end to the head anchorage picket, and then, pulling the wire taut, fixes it to the top of each

picket, finally finishing off on the end anchorage picket. No. 7 windlasses the French wire up to the barbed wire at points about 1 foot on either side of the pickets and also midway between them. No. 5 should be careful not to get too far away from No. 6 with his coil; always give No. 6 plenty of slack, and keep the barbed wire from getting entangled in the French wire as much as possible.

6. *C Party* has to bring out five man-loads of stores; No. 9 does two journeys; No. 8 three journeys. While No. 8 is doing his third journey No. 9 fixes the end of a coil of barbed wire to the head anchorage picket and then runs the coil out in front of the French wire till he reaches the end anchorage picket. He then drops the coil and goes back to assist No. 8, who should have brought out his last load by then to windlass the barbed wire on to the French wire about 1 foot from the ground. The end of the barbed wire is finally made fast to the end anchorage picket.

7. *A and B Parties* repeat the procedure detailed in paragraphs 1-5 with the inner belt of French wire.

8. As soon as *C Party* has finished putting the trip wire on the outer belt, it returns to the head of work, and Nos. 8 and 9 pick up a spiral each. No. 9, preceded by No. 8, walks down between the two belts, paying out the loose wire from the spiral as he goes along. When No. 9 has finished his spiral, he slips past No. 8, who then starts paying out loose wire from his spiral. Each spiral supplies enough loose wire for a 25 yards' length of entanglement.

### Notes.

1. The French wire coils are pulled out to 16 yards and the pickets put in 4 yards apart in order that calculations for stores may be easy and fit in with man-loads. The first French wire coil requires 5 pickets, every subsequent one 4 pickets, *i. e.*, a man-load, so that if one belt of French wire containing 20 French wire coils has to be erected the number of pickets are 12 man-loads plus one long picket and two anchorage pickets.

2. *C Party* is the only party that has to work in front of the wire.

3. It is found quicker to screw in the pickets first and lift the French wire over them, rather than staple down the French wire first and screw in the pickets afterwards. The reason for this is that the French wire almost invariably gets caught and twisted up in the eyes of the pickets.

4. It is a matter of opinion how many staples are necessary. If the loose wire is omitted, the proportion of staples to French wire coils should be six instead of four.

5. If wooden or angle iron pickets are used, Nos. 1 and 2 and Nos. 3

and 4, respectively, work together, Nos. 2 and 4 holding up the pickets while Nos. 1 and 3 maul them in.

6. Short lengths of concertina barbed wire may be used in place of barbed wire spirals.

## DRILL II.

### DRILL FOR 50 YARDS STANDARD DOUBLE BELT OF CONCERTINAS.

#### Material.

1. Eight bundles, containing four long screw pickets each.
2. One "mixed" bundle, containing two long screw pickets and four anchorage pickets.
3. Sixteen concertinas.
4. Two coils barbed wire.

#### Wiring Party.

One N.C.O. and 7 men. The N.C.O. carries cutting pliers, and each of the party a windlassing stick. Gloves as desired.

#### Carrying Party.

Two N.C.O.'s and 43 men. (If in trenches.)

One N.C.O. and 27 men. (If across country.)

#### Tasks of Wiring Party.

##### FOR ONE BELT

Party	No.	1st Task	2nd Task	3rd Task
N. C. O.		Carries out "mixed" bundle.	Direction and general supervision.	
A.	1	Carry out four bundles of pickets.	Lay out and screw in pickets.	Erect concertinas and windlass them together.
	2			
	3			
	4			
B.	5	Carry out 8 concertinas and make ready for erection; carry out 1 coil barbed wire.		Run horizontal wire along top of pickets and windlass concertinas up to it.
	6			
	7			

#### Detail.

1. The N.C.O. leads out whole party to head of work and all numbers undo their bundles.

2. When ready, the N.C.O. lays down first anchorage picket,

takes two paces, and lays down one long picket. He then paces out and indicates to No. 1 where to lay his four pickets. As soon as No. 1 has finished his bundle he screws in the five long pickets and anchorage picket.

3. The N.C.O. then indicates to Nos. 2, 3 and 4 in turn where to lay out their respective bundles of pickets. Each man then screws in his own four pickets. No. 4 also screws in the end of anchorage picket, which the N.C.O. lays down two paces from and in line with the long pickets.

4. *B Party* meanwhile brings out eight concertinas and lays them, roughly, about two paces behind every second long picket, starting from the head of the work. No. 5 brings out three concertinas. No. 6 brings out three concertinas. No. 7 brings out two concertinas, and in his third journey the coil of barbed wire. Each man is responsible that the concertinas he brings out are properly undone and ready for erection.

5. As soon as Nos. 1 and 2 have finished they go back to the head of the work and stretch out the first concertina. No. 1 slips his end over the first picket. No. 2 slips the bottom of his end only over the third picket. The second concertina is then stretched out. No. 1 slips his end over the third picket and then the top of the first concertina on the third picket. Meanwhile, No. 2 slips the bottom of his end over the fifth picket. This procedure is carried out for all the concertinas, except the last one, where No. 2 slips the whole of his end over the last picket. In this task Nos. 1 and 2 must only slip the concertina over the picket and not fix it in the top eye. This is necessary, as it makes work much easier for *B Party*.

6. As soon as Nos. 3 and 4 have finished screwing in their pickets, they return to the head of the work and assist Nos. 1 and 2. No. 3 works on the home side of the concertinas; No. 4 on the enemy side. No. 3 lifts the middle of each concertina over the center picket, *i. e.*, second, fourth, sixth, etc.), assisted by No. 4 if necessary. No. 3 also windlasses the concertinas together on the home side and No. 4 on the enemy side as they work along.

7. As soon as *B Party* has finished its first task, detailed in (4), it runs out the horizontal wire along the top of the pickets. No. 5 runs out the barbed wire coil. No. 6 fixes the end to the head anchorage picket, and then, pulling the wire taut, fixes it to the top of each long picket, finally finishing off on the end anchorage

picket. No. 7 windlasses the concertina up to the horizontal wire at points about 1 foot on either side of the pickets and also midway between them. No. 5 should be careful not to get too far away from No. 6 with his coil; also give No. 6 plenty of slack and keep the barbed wire as much as possible from getting entangled in the concertinas.

8. The above procedure is repeated, but for the second belt the pickets should be staggered as shown in diagram.

If wooden or angle iron pickets are used, Nos. 1 and 2 and Nos. 3 and 4, respectively, work together, Nos. 2 and 4 holding up the pickets while Nos. 1 and 3 drive them in.

### DRILL III.

#### DRILL FOR 50 YARDS LENGTH STANDARD LOW (OR KNEE-HIGH) WIRE ENTANGLEMENT.

##### Materials.

1. Nine bundles, containing six medium pickets each.
2. Two coils (100 yards) and three coils (50 yards) barbed wire.
3. Four spirals.

##### Wiring Party.

One N.C.O. and 7 men. The N.C.O. carries cutting pliers, and each of the party a windlassing stick. Gloves as required.

##### Carrying Party.

One N.C.O. and 18 men.

##### Tasks of Wiring Party.

Group	Nos.	1st Task	2nd Task	3rd Task	4th Task	5th Task
A.	1	Carry out 3 bundles pickets and 2 coils (100 yards) barb wire.	Lay out and screw in center line of pickets.	Diagonal wire in enemy bay.	Diagonal wire in home bay.	
	2					
	3					
B.	4	Carry out 3 bundles pickets and 3 coils (50 yards) barb wire.	Lay out and screw in outer line of pickets.	Horizontal wire on outer line of pickets.	Horizontal wire on center line of pickets.	Horizontal wire on inner line of pickets.
	5					
C.	6	Carry out 3 bundles pickets and 4 spirals.	Lay out and screw in inner line of pickets.	Loose wire in enemy bay.	Loose wire in home bay.	
	7					



## Detail.

1. The N.C.O. leads out the whole of his party and gets all his stores dumped in some convenient spot behind or near the head of the task. Each group is responsible for its own stores, as detailed above. A, being the larger group, will be ready first.

2. When ready, the N.C.O., followed by Nos. 1, 2 and 3, paces out and indicates to No. 1 where to lay pickets. As soon as No. 1 has finished his bundle he screws in his six pickets. The N.C.O. then follows the same procedure with Nos. 2 and 3.

3. As soon as the N.C.O. has thus laid out his center line of pickets he returns to the head of the task and supervises the laying out of the outer and inner line of pickets by *B and C groups*.

4. As soon as *A group* has finished its pickets, it returns to head of work and puts on the diagonal in the outer bay. No. 1 runs out the coil. No. 2 fixes wire on the outer line of pickets and No. 3 fixes the wire on the center line of pickets.

5. As soon as *B group* has finished its pickets, it returns to head of work and puts the horizontal wire on the outer line of pickets, No. 4 running out the coil and No. 5 fixing the wire on the pickets.

6. As soon as *C group* has finished its pickets, it throws the spiral wire into the outer bay—two spirals in each 50 yards bay.

7. When *B group* has finished the horizontal wire on the outer line of pickets, it comes back to the head of the work and puts the horizontal wire on the center line of pickets. Similarly *A group* and *C group* return to the head of the work and repeat the operations stated in paragraphs 4 and 6 in the home bay.

8. Finally, *B group* puts the horizontal wire on the inner line of pickets.

## Notes.

(a) The best men should be put in A group, and the next best in B group.

(b) Three men are put in A group, as it has by far the most difficult task to perform. If this is not done, it will be found that the other groups will be continually waiting.

(c) From paragraph 5 it can be seen that B group has to work in front of the diagonal wire laid by A group, but B group, having a much easier task, will overtake them and reach the end of the work first. It automatically begins the horizontal wire on the center line of pickets before A group is ready to start on the diagonal wire on the inner bay.

(d) If the loose wire is not made up in spirals, three men should be put in C group, as it is slow work to uncoil wire and throw it in loose.

(e) All low wire entanglements are slow at night, owing to the difficulty of seeing the pickets. If circumstances permit of tracing tape or spun

yarn being laid down along the center line of pickets, this difficulty may be to a great extent overcome and all groups get their direction automatically. If tracing tape is used, it can and must be taken up after the entanglement is finished.

(f) No change in the drill is necessary if wooden or angle iron pickets are used.

## DRILL IV.

### DRILL FOR 50 YARDS STANDARD DOUBLE APRON FENCE.

#### Materials.

1. Four bundles, containing four (long) pickets each.
2. Four bundles, containing eight anchorage pickets each.
3. Fourteen coils (50 yards) barbed wire (or two coils—100 yards, and 10 coils—50 yards).

#### Wiring Party.

One N.C.O. and 9 men. The N.C.O. carries cutting pliers, and each of the party a windlassing stick. Gloves as desired.

#### Carrying Party.

One N.C.O. and 15 men.

#### Tasks.

Group	Nos.	1st Task	2nd Task	3rd Task	4th Task	5th Task
A.	1 2 3	Carry out three bundles pickets.	Screw in long pickets.	Front diagonal wire	Bottom wire on fence.	Rear diagonal wire.
B.	4 5	Carry out 2 bundles anchorage pickets.	Screw in front anchorage pickets.	Front trip wire.	2nd wire on fence.	Top horizontal wire on rear apron.
C.	6 7	Carry out 2 bundles anchorage pickets.	Screw in rear anchorage pickets.	2nd horizontal wire on front apron.	3rd wire on fence.	2nd horizontal wire on rear apron.
D.	8 9	Carry out pickets and barbed wire.	1 bundle 14 coils	Top horizontal wire on front apron.	Top wire on fence.	Trip wire on rear apron.

#### Detail.

1. The N.C.O. leads out the whole party to the head of the work, and *A, B and C groups* undo their bundles when ready. The N.C.O. paces out and indicates to A group where to lay its pickets, commencing with No. 1 and finishing with No. 3. Having done this, the N.C.O. returns to the head of the work, picks up

the fourth bundle which D Party has brought out,, walks back again, and lays out this bundle. All numbers of A Party, as they finish their four pickets join the N.C.O. and screw in these last four pickets.

2. Meanwhile, *B and C groups*, getting the direction from the center line of the long pickets, lay out and screw in the whole of the anchorage pickets, B 4 being responsible for the anchorage picket at the head of the work and C 7 for the anchorage picket at the end of the work. Each number of both groups lays out and screws in his own bundle of pickets.

3. Meanwhile, *D group* brings out the remainder of the stores and dumps them at any convenient spot indicated by the N.C.O. This means that each man has to do four journeys.

4. As soon as *A group* has finished its posts, it returns to the head of the work and puts on the front diagonal wire. No. 1 runs out the coil, No. 2 fixes the wire on the posts, and No. 3 fixes the wire on the anchorage pickets.

5. As *B, C and D groups* finish their second task (*see Tasks*), they return to head of work and put horizontal wires on the aprons. Nos. 4, 6 and 8, respectively, run out the coils, while Nos. 5, 7 and 9 windlass the wire on to the diagonal wire. In doing this, Nos. 5, 7 and 9 should not step over the diagonal wire, but walk round the posts lifting their wire over the posts and then down into position on the diagonal wire.

6. As they finish each task, the various groups return to the head of the work and carry on with the next task in the order given.

### Notes.

(a) The best men should be put into A group; the next best in B group; the next best in C group and the last in D group.

(b) Three men are put in A group, as it has by far the most difficult task to do.

(c) All men work behind the wire the whole time.

(d) Nos. 1 and 2 must be careful to put the diagonal wire on fairly slack. It automatically gets tightened up when the horizontal wires are windlassed on.

(e) All diagonal wires and apron wires are begun and finished on the end anchorage pickets. The horizontal strands on the fence are *not* taken down to the end anchorage pickets.

(f) If wooden or angle iron pickets are used, Nos. 1 and 2 and No. 3 and the N.C.O. work together, No. 2 and the N.C.O. holding up the posts while Nos. 1 and 3 maul them in.

Plate 1.

Fig. 1



Plan showing commencement.



View showing finish.

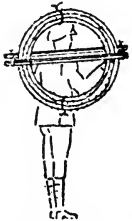
French wire made up for carrying.

Fig. 2



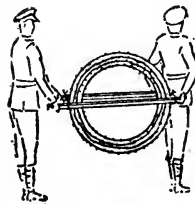
Concertina made up for carrying.

Fig. 3 (a).

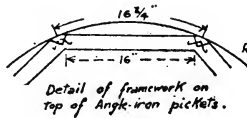


One man carrying Concertina on shoulder.

Fig. 3 (b).



Two men carrying concertina.



Detail of framework on top of Angle-iron pickets.

Radius of circle 2'0"

Fig. 4.

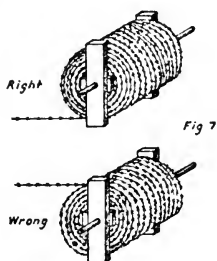
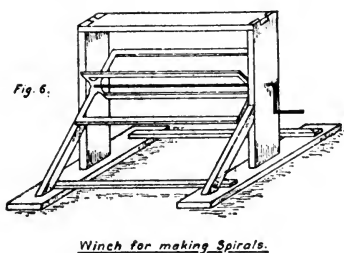
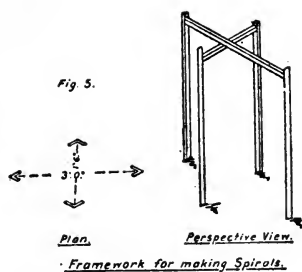


Plan.



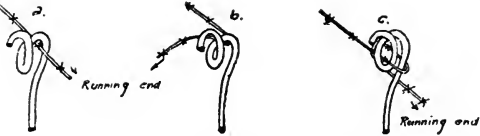
Perspective View.

Framework for making concertinas.



Right and Wrong way of running  
out a coil of barbed wire.

Fig. 8.

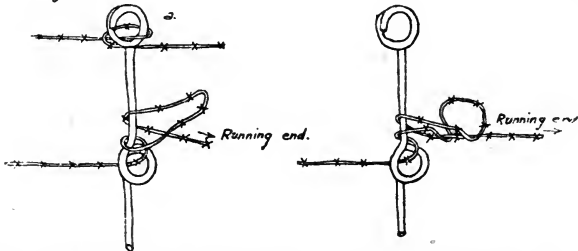


Sketch of top eye showing wire forced up into it.

2<sup>nd</sup> Operation showing running end turned over towards the end of the loop.

Showing wire threaded in eye and a round turn taken below the eye.

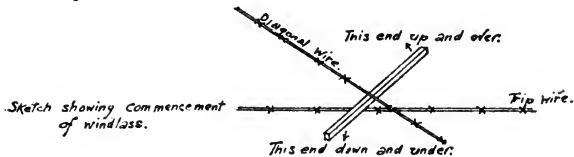
Fig. 9



Sketch showing a wire forced up into a lower eye of picket and the bight taken round the picket above the eye.

Showing bight finished off on the running end

Fig. 10.



Sketch showing commencement of windlass.

# 50 YD. STANDARD FRENCH WIRE ENTANGLEMENT.

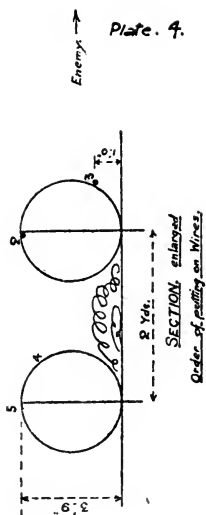
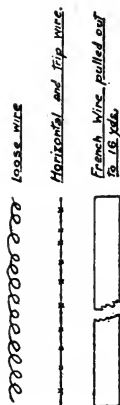
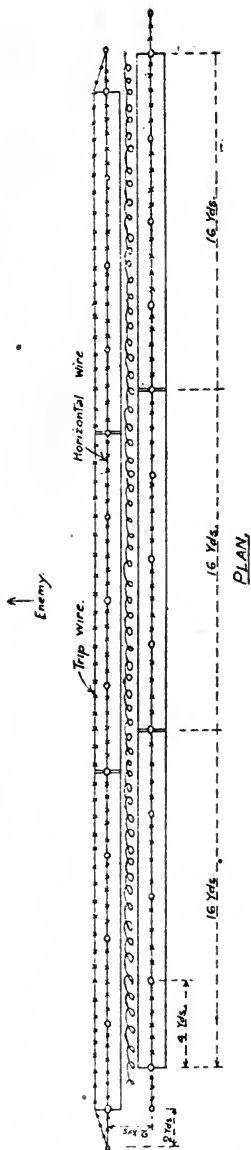
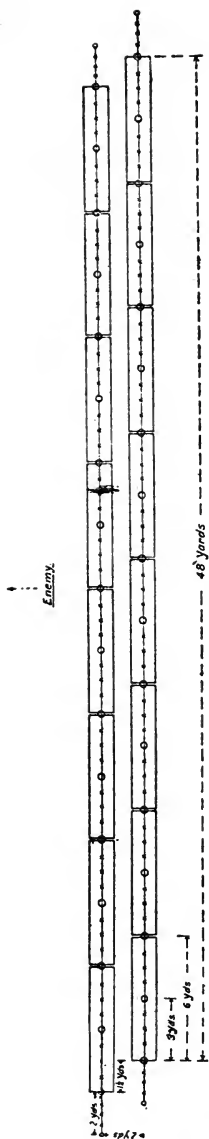
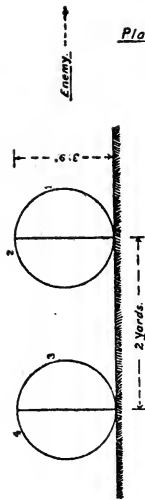


Plate. 4.

# 50 YD. DOUBLE BELT OF CONCERTINAS.



Plan.



Horizontal wire along top of posts.

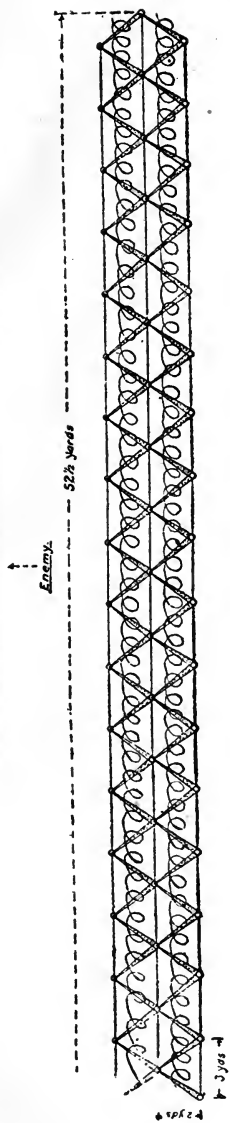


1 Concertina pulled out to 6 yards.

Section. (Enlarged.)

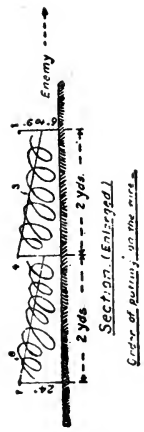


50 YD. STANDARD LOW WIRE ENTANGLEMENT.



Plan.

Inclined Wire.  
In plan.



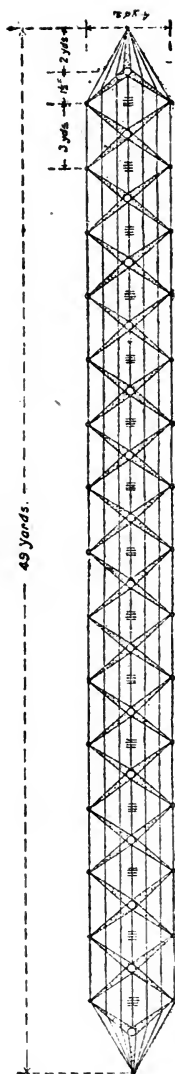
Section (Enlarged)

Centre of position on the wire

# 50 YD. STANDARD DOUBLE APRON ENTANGLEMENT.

Enemy's

49 yards.



Plan.



Elevation.



Plan.

4 Horizontal Wires.



Top end  
Left end

Inclined Wire.



Cross Section.

Order of putting on wires.

Photomount  
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Binder  
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Makers  
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